

निर्माण सामग्री एवं प्रौद्योगिकी संवर्द्धन परिषद्
आवासन और शहरी कार्य मंत्रालय, भारत सरकार
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL
Ministry of Housing & Urban Affairs, Government of India

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From the Desk of the Executive Director

There is urgent need for construction industry to bring perceptible changes to the construction practices in vogue, if we were to achieve the goals of sustainable, safe and resilient development including climate change mitigation. The most of our cities are polluted and we all are strained to breathe an air which is detrimental to health as per acceptable standards. It is also known that construction industry is one of the biggest polluter as regards air, water, noise, land pollution including solid waste generation. Therefore, it is time to adopt clean, green and sustainable materials and construction methodologies for India before it is too late. The irony of the matter is that most of the developed countries have already realized it and have been using new methods and materials for construction for quite a long time. Thanks to Pradhan Mantri Awas Yojna – Urban (PMAY-U), through which BMTPC in association with Ministry of Housing & Urban Affairs, Govt. of India is promoting use of such systems. BMTPC has identified and assessed these systems for their performance (visit <http://www.bmtpc.org>) and working with states and other agencies for their potential use in projects. Nevertheless, there is constant confrontation with regard to cost which restricts its usage particularly in Govt. setup because of L1 approach. It is time to shift from L1 to Quality and Cost based selection methods of procurement.

(Dr. Shailesh Kr. Agrawal)

National Workshop on “Processing and Use of Construction & Demolition Waste”



BMTPC organized a National Workshop on “Processing and Use of Construction & Demolition Waste” with theme ‘Deconstruction & in-situ processing for Ecology and Economics’ on November 21, 2017 at New Delhi.

The National Workshop was inaugurated by Shri Hardeep Singh Puri, Hon’ble Minister of State (Independent Charge), Ministry of Housing & Urban Affairs, Government of India. Hon’ble Minister in his inaugural speech said that sustainable waste management is the need of the hour keeping in view the ongoing Swachh Bharat Abhiyan of Govt. of India, which involves managing waste in an environmentally sound, socially satisfactory and techno-economically viable manner. The waste management hierarchy demands firstly, avoiding generation of waste, followed by reducing, reusing, recycling, recovering, treating and disposing whatever wastes produced. There is also pressing need to bring awareness about the problem of waste management and the necessity to adopt proper procedure of collection, processing, recycling and use of C&D wastes in manufacturing of building components among different stake holders of the country.

Shri Durga Shanker Mishra, Secretary, Ministry of Housing & Urban Affairs while addressing the

participants pointed out that various Central Schemes such as Smart Cities, Pradhan Mantri Awas Yojana and Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and other similar schemes are bringing increased activities in construction sector. Management and handling of solid wastes including C&D waste is a serious concern and has serious consequences due to the increasing quantum of waste, continuing shortage of dumping sites, and increase in transportation and disposal cost and various associated environmental issues. The construction and demolition waste generated through redevelopment process are required to be utilized as resources to not only reduce the cost of construction but to also help the movement of pollution control.

The National Workshop was organized by BMTPC jointly with Centre for Fly Ash Research and Management (C-FARM), New Delhi in association with Indian Building Congress, Builders’ Association of India and IL&FS Academy of Applied Development. The programme was attended by more than 100 participants from research and academic institutions, government organisations, municipal corporations, etc.

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Emerging Technologies for Building Construction

Monolithic Insulated Concrete System (MICS)

Monolithic Insulated Concrete System (MICS) is a system of formwork for reinforced concrete made with a rigid thermal insulation that stays in place as a permanent interior and exterior substrate for walls, floors and roofs. Monolithic Insulated Concrete System (MICS) results in cast-in-place concrete walls that are sandwiched between two layers of modules i.e. Expandable Polystyrene (EPS) separated by hard plastic ties. The modules are interlocking modular units that are dry stacked (without mortar) and filled with concrete once laid out. The units lock together and create a form for the structural walls or floors of a building. When cured, the wall supports the structural loads from floors and roofs, and the shuttering provides thermal insulation. Reinforcing steel shall be as required from design.

Upper and lower surfaces of the polystyrene modules are castellated and the vertical mating surfaces are tongue-and-groove to form a tight fit when joined together. The inner surfaces have tapered grooves running vertically and have offset on opposite faces to ensure uniform concrete thickness. They also form locks for end stops. The outer surfaces are grooved vertically to aid cutting and trimming. The modules are manufactured by Styro Stone, Spain and are presently imported by the applicant from Spain.

Raw Materials

- *Expanded Polystyrene (EPS):* Self-extinguishing type EPS shall conform to IS 4671: 1984 having density not less than 25 kg/m³ and valid Restriction of Hazardous Substance (ROHS) test certification.
- *Polyurethane (PU) Foam Adhesive:* Shall have Skin Formation of 8 min, Density 25 kg/m³, Sound insulation 58 dB, Insulation factor 35 mW/mK, Shrinkage < 2%, Fire rating B3, Insulation factor 35 mW/m.K and Water absorption of 1 % volume as per the specifications of Soudafoam 1K manufactured by McCoy Soudal, N Delhi.
- *Plasticizer:* Slump retaining super plasticizer for self-compacting plastic concrete (CEMWET SP-3000) shall conform to IS 9103:1999
- *Hard Plastic Tie:* Shall be made with High density polyethylene and shall be as per manufacturer's specifications.
- *Cast-in-place concrete:* The ingredients, grade of concrete & slump for walls, floors and roofs shall be used as per IS 456:2000.

Manufacturing Process of Modules

Pre-expansion

Expanded Polystyrene in the form of resin or beads of styrene shall be used. Each bead shall have a microscopic dot of pentane formed into its center. This shall be brought in air tight bags. These bags shall keep the beads "fresh" by assuring that the pentane within each bead cannot escape into the atmosphere and render the material unfit. The beads of styrene shall be about the size of a grain of salt and have

a similar consistency. The beads shall be stored in a tightly controlled environment where the amount of pentane within their plastic shell remains consistent. The beads of resin shall then be loaded into a machine called a "pre-expander". Steam shall be injected into the beads. The heat accomplishes that the wall of each bead shall be softened and become flexible and the increased temperature shall also cause the pentane to expand within the softened beads. The beads puff up like popcorn to 30 times their original size.

Conditioning

After expansion, the beads shall undergo a maturing phase between 12 to 48 hours to enable equilibrium temperature and pressure to be reached.

Moulding

The individual expanded beads shall then be moulded into a single, homogeneous block. Once again, steam shall be used to deliver heat to the process. A precisely measured quantity of beads shall be blown into a steel mold. Steam is then injected into the pre-expanded beads to heat the mix and causes the wall of each bead to soften and remaining pentane within each bead expands. This expansion shall cause the beads to increase in size within the steel mould. This expansion increases the pressure and the beads shall be forced together to form a single block. The soft bead walls shall allow the beads to melt together into a single solid block. At this point the mould opens like a clam shell and the block is removed.

After the block has been removed from the mould, this shall be weighed and marked so that it can be traced throughout the production process. Adherence to the proper weight assures that the correct "density" or "weight per cubic meter" is maintained.

Once the blocks have been moulded, perforated, weighed, and tested for proper fusion, these shall be moved to the "drying room". Large blowers then circulate the air within the room. This process removes as much of the moisture from the block as possible. The increased temperature also helps to reduce any internal stresses that may exist within the block as a result of the moulding process.

Special Features

- Energy saving
- Higher structural strength
- Healthy indoor air quality
- Low construction time and cost
- Saves water
- Allergens and termite proof
- Less repairs and maintenance
- Sound resistant
- Earthquake resistant construction.





Handing over of Demonstration Housing Project at Bhubaneswar, Odisha

In the context of the massive housing initiative by the Government of India and various States/UTs schemes and programmes, the Technology Sub-Mission under Pradhan Mantri Awas Yojana (Urban) facilitates adoption of modern, innovative and green technologies and building material for faster and quality construction of houses. Taking this forward, BMTPC during recent past, has initiated number of Demonstration Housing Projects in various parts of the country.

In response to proposal of the Ministry of Housing & Urban Affairs, Govt. of India to partner the Demonstration Housing Project in the State, the Housing & Urban Development Department, Government of Odisha indicated interest and thereafter Bhubaneswar Development Authority (BDA) allotted 0.43 acres land for construction of Demonstration Houses by BMTPC with Expanded Polystyrene Core Panel System (EPS) Technology at Chandrashekharpur, Bhubaneswar, Odisha.

Besides Ministry of Housing & Urban Affairs, the other Partnering & Funding agencies for the project are Department For International Development (DFID) & National Housing Bank (NHB).

Under the Demonstration Housing Project, construction of 32 dwelling units (G + 3) having plinth area of 28.23 sq.mts (303.75 sq.ft) per unit was undertaken.

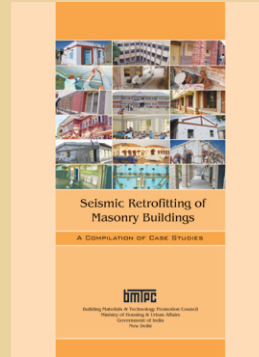
The project also includes on-site infrastructure work such as construction of pathways, boundary wall, water supply work, horticulture work, drainage & disposal and external electrification using solar panels etc.

During the construction, a Sensitization Programme on Emerging Technologies was organised for the State Govt. Engineers at Demonstration Housing Project at Bhubaneswar on May 15, 2017.

The Demonstration Housing Project after completion was handed over to BDA in December, 2017.

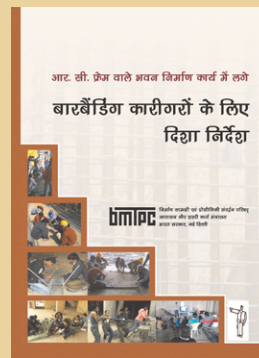
Recent Publications

Seismic Retrofitting of Masonry Buildings - A Compilation of Case Studies



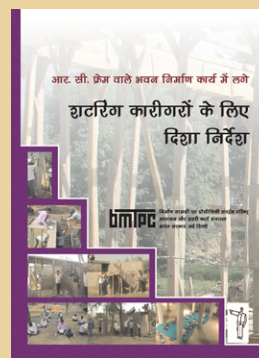
This publication showcases eleven projects of retrofitting of lifeline buildings carried out by BMTPC. The projects were undertaken not only to demonstrate the retrofitting technology but also to train local engineers, contractors and building artisans and to create awareness among people at large.

Magdarshika for Barbenders – “बारबैंडिंग कारीगरों के लिए दिशा निर्देश”



यह मार्गदर्शिका आर.सी. फ्रेम वाले भवन निर्माण कार्य में लगे बारबैंडिंग कारीगरों (प्रबलन सरिये से काम करने वाले कारीगरों) के लिए है। अच्छी गुणवत्ता वाला और टिकाऊ आर.सी.सी. का निर्माण कार्य करने के लिए सरिए से सुरक्षित, मजबूत और सही संरचना बनाने के लिए जरूरी जानकारी को इस किताब में समावेश किया गया है।

Magdarshika for Shuttering Artisans – “शटरिंग कारीगरों के लिए दिशा निर्देश”



यह मार्गदर्शिका आर.सी. फ्रेम वाले भवन निर्माण कार्य में लगे शटरिंग के काम, यानि शटरिंग और फरमाबंदी, करने वाले कारीगरों के लिए है। आर.सी.सी. का निर्माण कार्य करने के लिए सुरक्षित, मजबूत और सही सेंटरिंग और फरमाबंदी संरचना बनाने के लिए जरूरी जानकारी को इस किताब में समावेश किया गया है।

Special Issue of Newsletter “NIRMAN SARIKA”



BMTPC brought out a Special Issue of its Newsletter “Nirman Sarika” on the World Habitat Day 2017 theme “Housing Policies: Affordable Homes”. The special publication focuses on important issues related to the theme and contains invited articles/papers from experts in the field.

BMTPC's Participation in World Habitat Day 2017 Celebrations



As a part of the World Habitat Day Celebrations 2017, BMTPC organised Painting Competition for Differently Abled Children on the theme "Housing Policies: Affordable Homes" in the categories viz. Mentally Challenged, Hearing Impaired and Visually Impaired. The winners were facilitated during the World Habitat Day Celebration Function in New Delhi on October 5, 2017. Four publications were also brought out to mark the occasion by BMTPC which were released by the Hon'ble Minister during the Celebration Function.

Launch of Android and iOS Mobile Application on Earthquake Hazard Map of India - A joint initiative of NDMA & BMTPC



On the occasion of World Habitat Day celebrations, Shri Hardeep S. Puri, Hon'ble Minister of Housing & Urban Affairs, Government of India, launched the Android and iOS based Mobile App on Earthquake Hazard Map of India, in the august presence of Shri Durga Shanker Mishra, Secretary, Ministry of Housing & Urban Affairs on October 5, 2017 at Vigyan Bhawan, New Delhi.

The Mobile App is available on the Google Play Store and Apple App Store for android and iOS users respectively. As a part of Digital India programme of Government of India, the Mobile App will be helpful in providing necessary information with regard to earthquake zonation of the country to the professionals in particular and other users in general.

The Mobile App on "Earthquake Hazard Map of India" has been developed by BMT-

Performance Appraisal Certification Scheme - PACS

BMTPC operates a Certification Scheme to evaluate performance of innovative building products and technologies. Detailed activities carried out under Performance Appraisal Certification Scheme (PACS) for the period October 2017 to December 2018 are highlighted below:

Inspection of Works of the following new systems has been carried out by the officers of BMTPC and TAC members:

- a) Monolithic Insulated Concrete System (MICS)
- b) Resin Bonded Tiles (Plastic Waste)

Applications received for issue of PACs are in the pipe line as per the details given below:

- i. Cellular Lightweight Sugarcane Bagasse Ash Bricks (CSAB).
- ii. Nano Living System
- iii. Precast Hollowcore Wall Panels.
- iv. R-Panel
- v. Plaster Aggregate



For further details, please contact:



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